



New Grade 5 Science Standards

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Grade 5 Science: Preamble

Scientific Thinking and Inquiry, Science and Technology, Earth Science, Physical Science, and Life Science remain the fundamental principles of this rearticulation.

Scientific progress is made by asking relevant questions and conducting careful investigations. As a basis for understanding this concept, and to address the content in this grade, students should have the opportunity to develop their own questions.

As part of the scientific process, students should have the opportunity to experiment, investigate, and problem solve and should keep a notebook to record observations.

Other activities should be encouraged to develop a sound understanding of content.

Students should observe:

- a)** Stars and identify ones that are unusually bright, and others that have unusual colors, such as red or blue.
- b)** That some organisms consist of a single cell that needs an environment that can supply food, water, sometimes oxygen, and a way to dispose of waste. (Some single-celled organisms are anaerobes.)
- c)** That some organisms are made of a collection of similar cells that benefit from cooperating.

Students should investigate:

- a)** That when liquid water evaporates, it turns into a gas (vapor) mixed into the air, and can condense and reappear as a liquid when cooled or as a solid (ice) if cooled below the freezing point of water.
- b)** That heating and cooling cause changes in the properties of substances. For example, liquid water can turn into steam by boiling, and liquid water can turn into ice by freezing.
- c)** How some materials conduct heat much better than others, and poor conductors (insulators) can be used to reduce heat loss or gain.
- d)** That unbalanced forces cause changes in the speed and/or direction of motion of an object (acceleration).
- e)** That the greater the net force, F , applied to a body, the greater its acceleration, a .

Strand 1	Science and Technology
Standard 1 Scientific Thinking	Students should be encouraged to think scientifically: as a basis for developing this set of skills, and to address the content in this grade, Students should perform investigations. As a consequence Students should be able to :
	<p>5.1.1. Evaluate the validity of claims based on the amount and quality of the evidence cited.</p> <p>5.1.2. Explain that predictions can be based on what is known about the past, assuming that conditions are similar.</p> <p>5.1.3. Realize and explain why predictions may be more accurate if they are based on large collections of similar events for statistical accuracy.</p> <p>5.1.4. Determine area and volume of rectangular shapes from linear dimensions, using the expressions $A = l \times w$ and $V = l \times w \times h$.</p> <p>5.1.5. Understand how plotting data on a number line helps in seeing where the data lie, including the outliers.</p>
Standard 2 Inquiry	Science is based on Inquiry: as a basis for understanding the concepts of Scientific Inquiry Students should be encouraged to develop their own questions in a Scientific context. Students should be able to :
	<p>5.2.1. Recognize and describe how results of similar scientific investigations may turn out differently because of inconsistencies in methods, materials, and observations, or because of limitations of the precision of the instruments used.</p> <p>5.2.2. Be able to distinguish inferences from actual observations.</p> <p>5.2.3. Write instructions that others can follow to carry out an investigation.</p> <p>5.2.4. Read and follow step-by-step instructions when learning new investigations.</p> <p>5.2.5. Identify the controlled variable and at least one independent variable in a scientific investigation, when appropriate.</p> <p>5.2.6. Explain the distortion inherent in using only a portion of the data collected to describe the whole. Understand that it is sometimes acceptable to discard data.</p>
Standard 3 Technology	Technology provides tools for Scientific Inquiry: Students should be exposed to technology and should use technology in their investigations. Students should be able to :
	<p>5.3.1. Give examples of technology, such as telescopes, microscopes, and cameras, that enable scientists and others to observe things that are too small or too far away to be seen without them and to study the motion of objects that are moving very rapidly or are hardly moving.</p> <p>5.3.2. Give examples of advances in technology that have positively and/or negatively affected society.</p> <p>5.3.3. Give examples of materials not present in nature that have become available because of science and technology, such as cloth, metal alloys, plastic, ceramics, and concrete.</p>
Strand 2	Earth and Space Science
Standard 4 Space Science	Students will be introduced to Space Science: Students should have an appreciation for our solar system and the concept that there are other similar and dissimilar systems in space. Students should be able to :
	<p>5.4.1. Describe that, like all planets and stars, the Earth is approximately spherical in shape.</p> <p>5.4.2. Observe how telescopes are used both to magnify images of distant objects in the sky, including the moon and the planets, and to gather enough light from very dim objects to make them visible.</p> <p>5.4.3. Observe and describe that stars vary in size, but they are so far away that they</p>

	look like points of light.
Standard 5 Earth Science	Students will be introduced to Earth Science: Students should relate to the earth as a planet in our solar system. Students should be able to :
	<p>5.5.1. Describe the Earth as part of a system called the <i>solar system</i>, which includes the sun (a star), planets, comets, asteroids, and many moons.</p> <p>5.5.2. Recognize that the Earth is the third planet from the sun in our solar system.</p> <p>5.5.3. Demonstrate how the Earth orbits the sun in a year's time, and Earth rotates on its axis about once every 24 hours.</p> <p>5.5.4. Explain that the alternation between day and night and the apparent movement of the sun, moon, and stars across the sky depend on the rotation of the Earth on its axis.</p> <p>5.5.5. Explain that the air around us is matter and has weight (a force) and exerts pressure; explain that air pressure varies a little from place to place and from time to time.</p> <p>5.5.6. Describe that winds blow from areas of higher pressure to areas of lower pressure.</p> <p>5.5.7. Explain how global patterns, such as the jet stream and ocean currents, influence local weather and climate in ways that can be measured in terms of temperature, pressure, wind direction and speed, and amounts of precipitation.</p>
Standard 6 Water Cycle	Students will be introduced to the movement of Water through the Water Cycle and develop an understanding of the physical properties of Water: Students should be able to :
	<p>5.6.1. Describe that when liquid water evaporates, it turns into a gas (vapor) mixed into the air, and can condense and reappear as a liquid when cooled or as a solid (ice) if cooled below the freezing point of water.</p> <p>5.6.2. Explain how water moves in air masses from one place to another in the form of clouds, fog, or as invisible water vapor, and falls to the Earth as rain, hail, sleet, or snow.</p> <p>5.6.3. Describe that clouds are made of tiny droplets of water or ice crystals.</p> <p>5.6.4. Explain that water on Earth cycles through different forms and in different locations (e.g., underground water and vapor in the atmosphere).</p> <p>5.6.5. Using maps and globes, recognize that the Earth's oceans are all connected as one body of water that covers about three-quarters of the Earth's surface.</p>
Strand 3	Physical Science
Standard 7 Matter	Students will be introduced to concepts of Matter: Students should be able to :
	<p>5.7.1. Recognize that all matter is made of small particles called <i>atoms</i>, which are too small to see with our eyes; describe how atoms may combine to form molecules or crystalline solids (compounds).</p> <p>5.7.2. Recognize that there are more than 100 different kinds of atoms (each called an <i>element</i>), which are displayed on the periodic table of the elements.</p> <p>5.7.3. Explain that all matter is made up of an element, a compound, or mixtures of elements and compounds.</p>
Standard 8 Heat and Energy	Students will be introduced to concepts of Heat and Energy: Students should be able to :
	<p>5.8.1. Describe that heating and cooling cause changes in the properties of substances. For example, liquid water can turn into steam by boiling, and liquid water can turn into ice by freezing.</p> <p>5.8.2. Explain that many kinds of chemical changes occur faster at higher temperatures.</p> <p>5.8.3. Explain that when a warm object and a cool one are placed in contact, heat flows from the warmer object to the cooler one until they are both at the same</p>

	<p>temperature. Know that heat transfer can also occur at a distance by radiation.</p> <p>5.8.4 Describe how some materials conduct heat much better than others, and poor conductors (insulators) can be used to reduce heat loss or gain.</p>
Standard 9 Forces and Motion	<p>Students will be introduced to concepts of Forces and Motion. Students should be able to :</p>
	<p>5.9.1. Explain that objects can move with a very wide range of speeds, with some moving very slowly and some moving too quickly for people to see them.</p> <p>5.9.2. Demonstrate that if the forces acting on an object are balanced so that the net force is zero, the object will remain at rest if it is initially at rest or will maintain a constant speed and direction if it is initially moving.</p> <p>5.9.3. Describe that unbalanced forces cause changes in the speed and/or direction of motion of an object (acceleration).</p> <p>5.9.4. Describe that, for an object moving in a straight line, acceleration, a, is the change in velocity, v, divided by the time, t, that change takes ($a = v \div t$).</p> <p>5.9.5. Describe that the greater the net force, F, applied to a body, the greater its acceleration, a. Describe that the greater the mass, m, of an object, the smaller the acceleration produced by a given force.</p> <p>5.9.6. Demonstrate and explain that things on or near Earth are pulled toward Earth's center by the gravitational force that Earth exerts on them.</p>
Strand 4	Life Science
Standard 10 Cell Biology	<p>Students will be introduced to concepts of Cell Biology and appreciate the function of the cell as the smallest sub-unit of living organisms. Students should be able to :</p>
	<p>5.10.1. Describe that some organisms consist of a single cell that needs an environment that can supply food, water, sometimes oxygen, and a way to dispose of waste. (Some single-celled organisms are anaerobes.)</p> <p>5.10.2. Explain that some organisms are made of a collection of similar cells that benefit from cooperating.</p> <p>5.10.3. Explain that in complex organisms such as humans, cells can have a very wide variety of forms and perform very different roles (e.g., nerve cells, muscle cells, and fat cells).</p>
Standard 11 Inheritance	<p>Students will be introduced to concepts of Inheritance in living organisms and learn about the importance of reliable inheritance mechanism in organisms. Students should be able to :</p>
	<p>5.11.1. Explain why there must be a reliable way to transfer information from one generation to the next in order for offspring to resemble their parents.</p> <p>5.11.2. List some characteristics of plants and animals that are fully inherited (e.g., form of flower, shape of leaves) and others that are affected by the climate or environmental conditions (e.g., browning of leaves from too much sun, language spoken).</p>
Standard 12 Adaptation and Survival	<p>Students will learn about Adaptation and Survival and its importance to the continuity of life. Students should be able to :</p>
	<p>5.12.1. Explain that in any particular environment, some kinds of plants and animals survive well, some do not survive as well, and some cannot survive at all.</p> <p>5.12.2. Identify organisms that are not native to the Washington, DC, area and how they undergo changes to increase their chance of survival in the area.</p> <p>5.12.3. Explain how organisms can cause changes in their environment to ensure survival, and these changes may affect the ecosystem (the living and nonliving components of the environment).</p> <p>5.12.4. Explain that organisms fit enough to survive in a particular environment will</p>

	<p>typically produce offspring fit enough to survive and reproduce in that particular environment. Over time, these inherited characteristics are carried as the predominant forms (e.g., adaptations such as shape of beak, length of neck, shape of teeth).</p> <p>5.12.5. Explain how changes in an organism's habitat are sometimes beneficial and sometimes harmful, and how changes in the environment (drought, cold) have caused some plants and animals to die, migrate, or become extinct.</p> <p>5.12.6. Explain that many plants and animals can survive harsh environments because of seasonal behaviors (e.g., in winter, some trees shed leaves, some animals hibernate).</p> <p>5.12.7. Recognize that some animal behaviors are instinctive (e.g., turtles burying their eggs, human infants crying when hungry) and others learned (e.g., a wolf's hunting skills, humans' ability to build fires for warmth).</p> <p>5.12.8. Describe well-defined plant behaviors, such as the way seedlings' stems grow toward light and their roots grow downward in response to gravity.</p> <p>5.12.9. Examine the information that fossils provide us about living things that inhabited the Earth in the distant past, and describe how they can be compared both to one another and to living organisms according to their similarities and differences.</p> <p>5.12.10. Recognize and describe how artifacts and preserved remains provide some evidence of the physical characteristics and possible behaviors of human beings and their ancestors who lived long ago.</p>
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